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DEVICE FOR AEROBIC BIOLOGICAL WASTE WATER PURIFICATION  
[VORRICHTUNG ZUR AEROBEN BIOLOGISCHEN ABWASSERREIGNUNG]

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The invention concerns a device for aerobic biological waste water treatment, with microorganisms staying in place.

It is known to form the growing surfaces for microorganisms by means of a loose filling of stones or plastic material, respectively plastic pipes with cross-pieces arranged in honeycomb fashion in the interior, or corrugated plastic films, over which the waste water is sprayed from above. The air passing through provides the microorganisms with oxygen. However, it is also known to provide these growing areas with disks, plates, or grids that are periodically immersed in the waste water and then exposed to the air again. In this case the absorption of nutrients from the waste water alternates with the absorption of oxygen from the air.

The methods named have the disadvantage that they require a considerable technical expense and constantly consume energy.

The desire to reduce the energy expenditure and simplify the technical construction led to the development of the un-aerated waste water pools. However, these have the disadvantage that the oxygen can enter only via the surface of the water and therefore the loading capacity of the waste water pools is low, respectively depends on the surface to volume ratio.

The object of the invention is to create a device in which the technical expense is low, the energy consumption small, and the surface requirement is less than in the known devices.

The basic concept of the invention is to make a growing surface available to the microorganisms that is wetted by the water to be

purified on one side and is exposed to the air on the other side. The object of the invention is accordingly achieved by forming the growing surfaces for the microorganisms out of a membrane that is permeable for gases, but impermeable for water, that is wetted by the waste water on one side and stuck by air on the other side. It is advantageous that the membrane lie against small surfaces of a supporting body serving for the air supply. In this case the supporting body may consist of coarsely porous material.

The drawing shows the object of the invention in an example of an embodiment.

A supporting body 1 of porous material is covered with a membrane film 2. The covering is not on all sides, since the upper side of the supporting body must be in direct connection with the air in order to conduct the air through its pores in order to pass through the film. The film is made so that it is permeable for oxygen, but not permeable for water. Films of this kind are known.

If the plate is immersed into the water to be cleaned, a bacterial growth 3 forms in the outer surface of the film, to which oxygen necessary for the life of the aerobic bacteria diffusing from the interior of the supporting body is made available.

The material of the supporting body is to be made so that the largest possible free intermediate spaces are present, so that an unhindered air exchange between the interior of the body and the outer air is possible.

The thickness of the porous supporting body is in the range of several centimeters and depends on the size of the growth surface in order to guarantee a reliable air exchange. In the case of an immersion depth of more than half a meter it may be necessary in the case of a smaller thickness of the supporting body to increase the air exchange by means of a blower or the like. However, in order to save energy a corresponding dimensioning of the supporting body is preferred.

The cross-section of the supporting body is basically insignificant. However, it is advantageous if the body has a flat, plate-like form, so that the surface present for the bacterial growth and oxygen diffusion is as great as possible.

According to the tests up to now, the required growth surface for each population equivalent value connected with the device according to the invention should amount to around 5 to 10 m<sup>2</sup>. This corresponds to a growth surface of around 35 to 70 m<sup>2</sup> per 1 m<sup>3</sup> of waste water per day.

The waste water purification installation built according to the invention operates in the same way as a waste water pool without mechanical devices and without energy supply. However, since not only the bottom and the walls of the basin are available as growth zones, and not only the free water surface is available for the entrance of oxygen, the installation may be loads significantly more than a pool installation, so that the space requirement is low.

Claims

1. A device for aerobic biological waste water purification with microorganisms staying in place, wherein the growth surfaces for the microorganisms are made out of a membrane permeable for gases, impermeable for water, that on one side is wetted by waste water and on the other side by air.
2. The device according to Claim 1, wherein the membrane lies against small surfaces of the supporting body serving for the air supply.
3. The device according to Claim 2, where the supporting body consists of coarsely porous material.

